

MB-V-A

3000 WATT ANTENNA TUNER INSTRUCTION MANUAL



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WHY USE AN ANTENNA IMPEDANCE MATCHING NETWORK--(MATCHBOX)?

-There are many reasons to use an antenna tuner-

1. To match the transmitter or amplifier output impedance with the antenna input impedance at various frequencies, thus insuring the greatest transfer of power to a given antenna.
2. A good tuner will reduce radiated interference. An antenna tuner properly adjusted will provide 20 or more DB attenuation at 2nd harmonics and above. This amounts to a reduction of harmonic output power of more than 100 to 1. An important consideration when running Tri-Band beams and other multiband antennas. This is something not accomplished with a standard low pass filter, which normally starts attenuating around 45 MHz. Thus your tuner will reduce the amount of spurious radiation from your radio station and reduce the interference to other services.
3. An antenna tuner allows you to tune over a much wider range of frequencies and still maintain an excellent power transfer to a given antenna.
4. The final amplifier in any transmitter or linear is subject to greater loads as the SWR increases and this extra load results in added heat loss and shorter life for the equipment as well as poor performance. Many of the new solid state amplifiers have limiting circuits that reduce the power output if the SWR exceeds a pre-determined value. Some units will be damaged if the SWR is too high. The antenna tuner reduces the load on the amplifier.
5. Perhaps of equal importance and often overlooked is the attenuation of unwanted signals into your receiver thus improving reception. The antenna tuner becomes a tuned RF circuit to the input of your receiver.

AN ANTENNA TUNER IS AN EXCELLENT AND VALUED ADDITION TO ANY RADIO STATION. AMATEUR OR COMMERCIAL.....

NYE VIKING MB-V-A TUNER LOG

NYE VIKING ANTENNA IMPEDANCE MATCHING NETWORK

MODEL MB-V-A

DESCRIPTION:

[illegible]

The Nye Viking MB-V-A antenna impedance matching network is a PI network system consisting of a large variable, silver plated copper ribbon inductor with a spill section, high voltage variable capacitor and a bank of high voltage fixed capacitors to provide a wide range of input-output impedance ratios.

Output terminals are provided in the rear for two 50 or 72 ohm output cables at connectors 'A' & 'B' and three porcelain cone feedthrough insulators. Two of the feedthroughs are for balanced line feeders at 'D' and the single wire output at feedthrough 'C'.

A five position switch is provided for all antenna switching. (A Direct) -- Connects the transmitter output directly to Coax "A", bypassing the tuner.

- A -- Connects the tuner output to Coax 'A'.
- B -- Connects the tuner output to Coax 'B'.
- C -- Connects the tuner output to single wire output 'C'.
- D -- Connects the tuner output to twin lead output 'D'.

CAUTION: DO NOT OPERATE THE ANTENNA SWITCHES WITH POWER ON.

An automatic SWR meter is provided for direct reading of SWR in line graduations from 1:1 to 20:1, and a Forward Power Meter with switching scales for monitoring the antenna tuning process.

The MB-V-A will handle power in excess of 3000 watts PER sideband and CW with a continuous rating of 1500 watts into loads between 40 and 2000 ohms impedance with an SWR reading below 1.1:1.

A three kilowatt, trifilar wound, broad band balun provides balanced output to twin lead feeders 100 to 1000 ohms resistance and unbalanced output impedance down to 20 ohms at the Coax "A" & "B" outputs.

The unit features 2 1/4" tuning knobs with 4° dials; a 1 to 25 vernier readout over 360 degrees on the variable inductor tuning plus 360 degree readout on the variable capacitor. The extra heavy gauge aluminum turntable cabinet provides adequate shielding.

The input connector from the transmitter or linear amplifier is a standard SO-239 UHF connector and the output terminals are high voltage porcelain feedthrus and SO-239 Delrin UHF coax connectors for 50 or 72 ohm coaxial cables.

Frequency range is 3.5-30 MHz (80-10 meters) with limited coverage of the 1.8-2.0 (160 meter) band. The size is 36.8 cm. wide, 17 cm. high, 35 cm. deep. (14 1/2" wide, 6 3/4" high and 12 1/4" deep) Weight: 6 Kilograms--shipping wt: 8.5 Kilograms (20 lbs).

INSTALLATION

The Nye Viking MB-V-A Matchbox should be installed as close to the transmitter or linear amplifier as possible. The shorter the coax cable the better. In case of TVI, a Nye Viking Low Pass Filter, Model QZ0-001, should be installed between the transmitter or final amplifier and the MB-V-A input.

A good ground system is essential especially when tuning single wire antennas. It should be as short and as heavy as possible and connected to a low resistance grounding rod. If adequate ground connection cannot be achieved, a system of ground radials should be installed (see ARRL Handbook). Too poor of a ground will result in station equipment becoming "hot" with RF. This could be the cause of TVI, distorted transmitted audio, and if bad enough cause RF burns when coming in contact with metal parts.

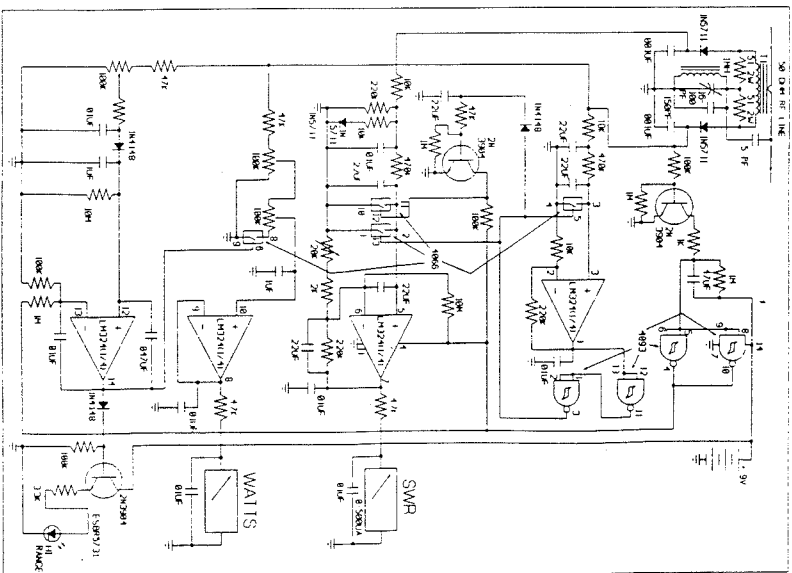
Single wire antenna length is not critical but should exceed the minimum lengths shown on the chart for each wavelength. Too short and antenna will not tune to resonance, will not load properly, and will have a higher than 1:1 SWR. Antennas exactly 1/2 wavelength long should be avoided with single wire antenna installations to reduce the antenna impedance at the Matchbox connection.

Single wire and twin lead feeders are "hot" at the Matchbox end and should be well insulated where they pass through walls and partitions to the outside. Voltages in excess of several thousand volts are easily possible.

Antennas fed with 50 or 72 ohm cable should present a reasonable match at the antenna to cable junction or there will be strong standing waves on the coax with inherent losses and possible cable failure. Antenna systems of this type should be cut to frequency and matched to cable, either with a balun or matching stub. Short lengths of 10' or less to a matching network should present no problem.

Connect single wire antennas to the stand-off insulator in the rear, terminal "C". Antennas terminating at less than 40 ohms (i.e. 1/4 wave or shorter) can be connected to one of the coax outputs "A" or "B".

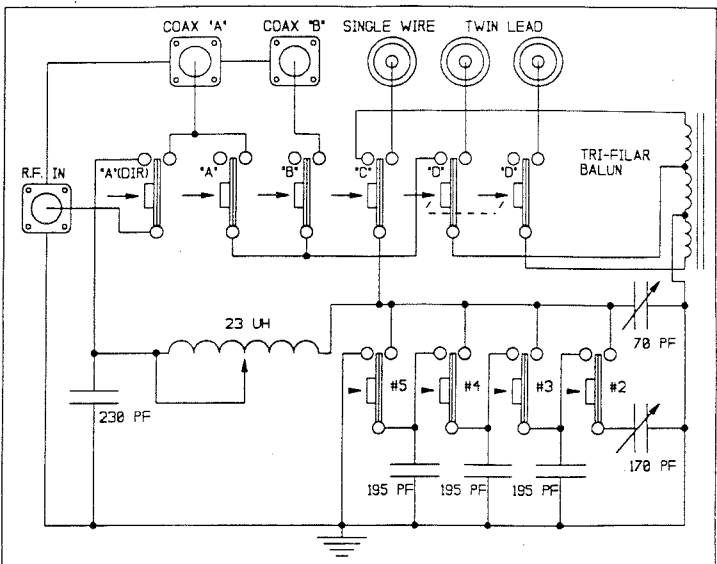
The SWR/Watt meters require a 9 volt battery to operate. A fresh battery must be installed before using. To replace the battery, remove the screws holding the cover to the battery compartment on the panel. The battery should be replaced at least once a year or as high/low scale switching on the forward power meter starts switching lower than 300 watts. The meter has an electronic switch, which with 10 watts of applied RF, will turn on the meter and will automatically turn the meter off approx. 1 minute after RF has been removed.



**AUTO-SWR-WATTMETER
SCHEMATIC**

DRAWING NUMBER
806000A

12.15.88



DRG # 60515A
12-15-86

The watts forward meter is scaled 0-300 watts average forward power. The meter will automatically switch to the 3000 watt scale if the forward power exceeds 300 watts. A test LED located on the front panel will LIGHT when the meter switches to the high power scale. The meter will stay on the high power scales for about five seconds after the power falls below 300 watts. Multiply the scale reading by 10 when the LED is on.

Your new Nye Viking Automatic SWR and average watt meters require no adjustment during tune up and use. The R.F. switch shuts the battery off after one (1) minute of below five watts of input.

To provide power for the meter back lighting lamps connect a 12 volt (AC or DC) source, of at least .2A capability, to the 12 volt phono jack on the rear panel. A front panel switch is provided for the lamps.

RECOMMENDED ANTENNA LENGTHS

80 Meter	30 feet or longer (45-150 ideal)
40 Meter	20 feet or longer (25-100 ideal)
30-20 Meter	15 feet or longer (20-100 ideal)
15-10 Meter	8 feet or longer (10-50 ideal)

Short antennas (less than 3/4 wave) will be directional broadcast to the length of the antenna wire. Long antennas (over 2 wavelengths) will tend to be directional off the ends.

CAUTION

The "Hot" end of an antenna cut close to 1/2 wavelength, or multiple thereof, will have relatively high voltages at moderate power. i.e., 1500 watts P.E.P. at 2000 ohms impedance will have over 2400 volts peak at each end of a half wave antenna or multiple thereof. At 600 ohms twin lead, there will be over 1300 volts. Adequate insulation should be provided at all feed thru points of the antenna. Care should be exercised to avoid contact to prevent R.F. burns.

The capacitor push button switches should NEVER be operated while power is on. All tuning should be done at low power.. (100 watts or less). Do not apply power with the inductor tuning knob removed. The shaft is "HOT" with input level RF voltage.

CAPACITOR SWITCH

The 4 push buttons of the capacitor switch allow 5 different amounts of parallel capacity to be switched in and out. There are 3ea 195 pF fixed capacitors and the variable capacitor has two sections. When the #5 push button is depressed all 5 capacitors are connected in parallel. Depressing the #4 button disconnects one of the fixed capacitors. Depressing the #3 button disconnects 2 of the fixed and depressing the #2 button leaves only the 2 sections of the variable capacitor connected across the output. Releasing all buttons leaves only one section of the variable connected. To release all buttons simply depress any button part way. Never press more than one button at a time. If all buttons are depressed for some reason, it will be necessary to remove the cover of the tuner and push the metal slider bar on the right side of the capacitor switch to release.

OPERATION

With all connections completed: antenna(s), transmitter, linear if applicable, receiver, a good ground, etc., push one of the antenna switch buttons in to connect the desired antenna. (If your transmitter and/or linear require pre-tuning, it might be advisable to connect a dummy load to the A* coax output and tune up with bypass push button depressed. Then select whichever antenna you desire.)

Tune the receiver to the desired frequency and tune in a signal. Tune the inductor coil and capacitor dials on the tuner for maximum signal strength. If the capacitor tuning gives maximum signal strength at 100 then add capacity by pressing the appropriate push button and re-tuning. If the maximum signal is still 100 then press the next higher number push button and so on until the maximum signal is tuned in at some number between 0 and 100. Conversely if the maximum signal strength is received when the capacitor dial reads 0 reduce the output capacity by depressing the next lower number. Starting at the lowest capacity and working up is the recommended procedure. Low impedance antennas will generally require more capacity in the output circuit and high impedance antennas less. The maximum necessary output capacity will drop with the increase of frequency (see caution-10-15 meters).

Once the tuner has been pre-tuned you can turn on the transmitter at low power (15 to 100 watts) and tune the inductor and capacitor for minimum reading on the SWR meter. Be sure you maintain at least 5 watts forward power while tuning, and repeat the above procedure described for pre-tuning.

When the tuner has been adjusted for minimum SWR, re-tune the transmitter for maximum watts forward. The linear can now be turned on and adjusted for maximum output. Little or no change should be necessary to the antenna tuner.

Once you have tuned up on a frequency with a given antenna, log the readings for that frequency and antenna for future reference. If you tune up and log the lower, middle and high end of each band it should be very simple to tune up on any frequency by referring to your log. A separate log should be made for each antenna.

Slight differences in tune settings will be noted during rainy periods as compared to dry, and also when other objects are brought closer or further away from the antenna.

4.

Some short, single wire antennas will present a lower impedance at the tuner than can be tuned at the single wire terminal "C". Connect these antennas to one of the coax output connectors center pin. A banana plug makes a good connector for a single wire into the coax output.

The Nye Viking ANT-001 Antenna makes an ideal antenna to use with your Nye Viking Tuner.

CAUTION!!!

Be sure power is OFF while changing the capacitor or antenna switches. They were NOT designed to handle the arcing that can occur during switching with power on....

CAUTION (10-15 Meters)

When tuning the MB-V-A it is necessary to use only the least amount of fixed capacity for a proper match. Push button #5 for instance, should never be used on the 10 or 15 meter band. There is a condition, when using the higher bands with too much capacity, which will cause damage to the tuner due to high circulating currents. Always start your tuning procedure on these bands with all capacitor push buttons out and 0 on the variable.

WARRANTY

"Nye Viking" products manufactured by the Wm. M. Nye Company, Inc., are guaranteed to the original purchaser for a period of two (2) years from the date of original purchase against mechanical breakdown and/or electrical failure, except damage caused by willful act or destruction by fire. The Company's liability shall be limited to repair or replacement of the defective item, at the Company's discretion, F.O.B. the Company's factory in Bellevue, WA.

This warranty gives specific legal rights, and you may also have other rights which vary from state to state.

In accordance with the Magnuson-Moss Warranty Act, effective January 1, 1977.